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Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Higher Tier
January 2010

Science B
Unit Chemistry C1

Chemistry
Unit Chemistry C1

Written Paper

Monday 18 January 2010 9.00 am to 9.45 am

You will need no other materials.
You may use a calculator.

Time allowed

- 45 minutes

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

CHY1H
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J A N 1 0 C H Y 1 H O 1

G/J50117 6/6/6/

CHY1H

Answer **all** questions in the spaces provided.

1 Rapeseed oil can be used for cooking.

A label on a bottle of rapeseed oil stated:

Rapeseed oil is healthy because it is

- low in saturated fat
- high in poly-unsaturated fat.

Two students investigated if the statement was true. They found the following information about four oils.

	Rapeseed oil	Sunflower oil	Olive oil	Corn oil
Saturated fat (%)	6.6	12.0	14.3	14.4
Mono-unsaturated fat (%)	59.3	20.5	73.0	29.9
Poly-unsaturated fat (%)	29.3	63.3	8.2	51.3
Melting point (°C)	5	−18	−12	−15

1 (a) Does this information support the two claims made on the label?
Explain your answers.

1 (a) (i) ‘Rapeseed oil is low in saturated fat.’

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(1 mark)

1 (a) (ii) ‘Rapeseed oil is high in poly-unsaturated fat.’

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(1 mark)



- 1 (b) Rapeseed oil contains unsaturated fats.

How could the students test the oil to show that it contained unsaturated fats?

Test.....

.....

Result of test

.....

(2 marks)

- 1 (c) Rapeseed oil can be hardened by reacting it with hydrogen.

- 1 (c) (i) What would happen to the melting point of rapeseed oil if it was hardened?

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(1 mark)

- 1 (c) (ii) One student claimed that hardening would make the rapeseed oil healthier.

Explain why the student is wrong.

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(2 marks)

7

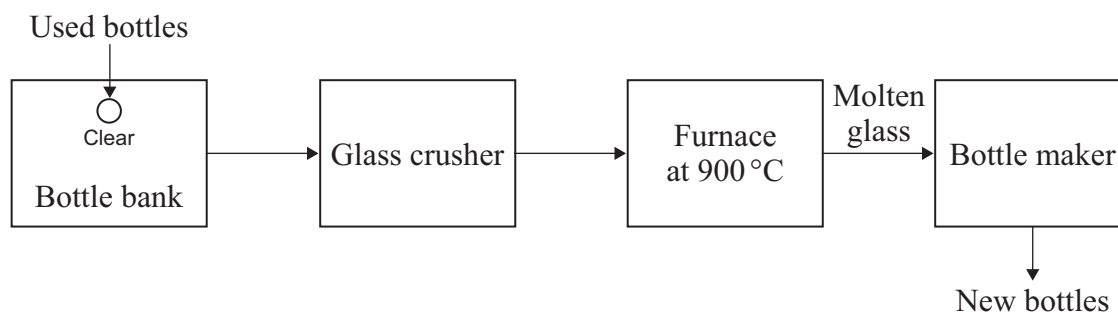
Turn over for the next question

Turn over ►



2 In recent years we have become more aware of the need to recycle glass.

2 (a) Used glass bottles can be recycled if they are put into bottle banks.



2 (a) (i) Suggest **one** reason why light bulbs should **not** be put into bottle banks.

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 (1 mark)

2 (a) (ii) Very few glass bottles are reused (used more than once).

Suggest **one** reason why.

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 (1 mark)

2 (a) (iii) New glass bottles can also be produced by heating, at 1700 °C, a mixture of the following raw materials:

sand (silicon dioxide), SiO_2
 soda ash (sodium carbonate), Na_2CO_3
 limestone (calcium carbonate), CaCO_3

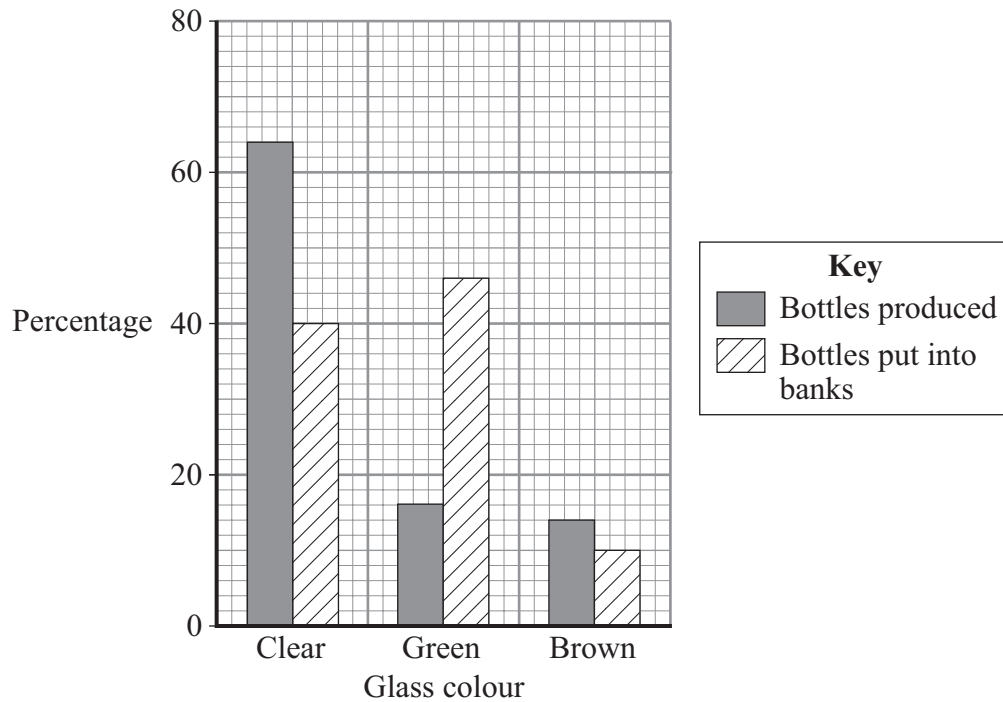
Explain why the use of recycled glass to make glass bottles produces less carbon dioxide than making glass bottles from these raw materials.

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 (2 marks)



- 2 (b) The bar chart shows the percentages of glass bottles produced and the percentages of glass bottles put into bottle banks in the UK.



- 2 (b) (i) The percentage of green glass bottles produced is 16%.
What is the percentage of green glass bottles put into bottle banks?

Percentage = %
(1 mark)

- 2 (b) (ii) More green glass bottles are put into bottle banks than are made in the UK.
Suggest **one** reason why.

.....
.....
(1 mark)

- 2 (b) (iii) Suggest and explain **one** problem resulting from the percentage of clear glass bottles produced in the UK.

.....
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(2 marks)



3 Many human activities result in carbon dioxide emissions.
Our carbon footprint is a measure of how much carbon dioxide we each cause to be produced.

3 (a) Why should we be concerned about our carbon footprint?

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(1 mark)

3 (b) Most power stations in the UK burn coal.
Coal was formed from tree-like plants over millions of years.

Suggest why burning wood instead of coal would help to reduce our carbon footprint.

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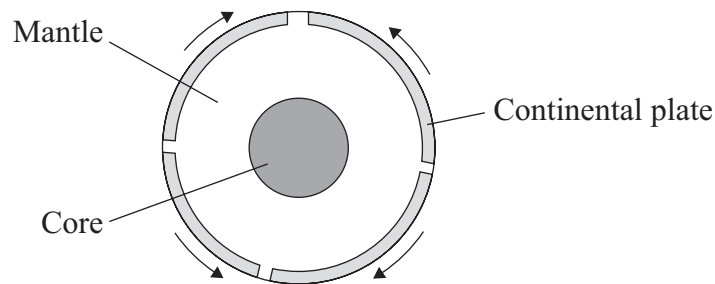
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(3 marks)



- 4 In 1915 Wegener proposed his idea of continental drift. About 50 years later the theory of plate tectonics was developed and this confirmed his idea.



- 4 (a) Give **one** reason why Wegener's idea was not accepted in 1915.

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(1 mark)

- 4 (b) The theory of plate tectonics is used to explain why earthquakes occur.

Explain how earthquakes occur.

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(2 marks)

- 4 (c) Suggest why it is difficult to predict when an earthquake will occur.

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(1 mark)



- 5 In the UK copper is produced from imported blister copper (98% pure), which has been extracted from copper ores.
- 5 (a) In the first stage of purification, air is blown into molten blister copper to remove any sulfur.
- 5 (a) (i) The sulfur reacts to form a gas that should **not** be allowed to escape into the atmosphere.

Explain why.

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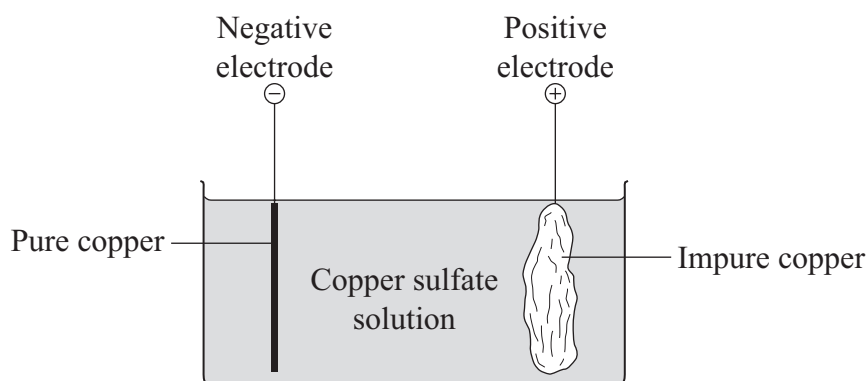
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(2 marks)

- 5 (a) (ii) After the removal of sulfur the slightly impure copper is cast into anodes. The copper in these anodes is purified by the process shown.



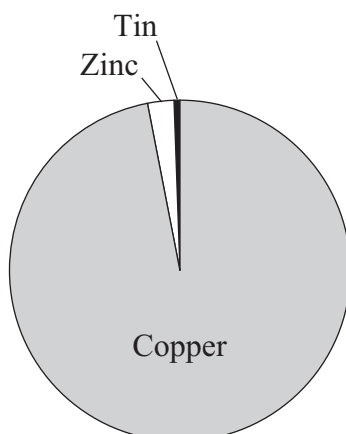
What is the name of this type of process?

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(1 mark)



- 5 (b) One use of copper is to make 2p coins.



The composition of a 2p coin in 1991

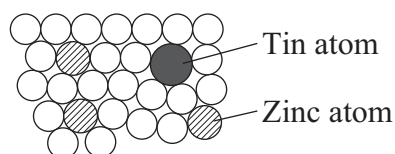
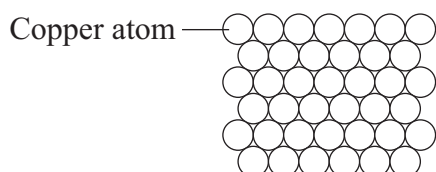
- 5 (b) (i) How was copper made harder for use in 2p coins in 1991?

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(1 mark)

- 5 (b) (ii) Use the diagrams to help you to explain why the metal used in 2p coins was harder than pure copper.



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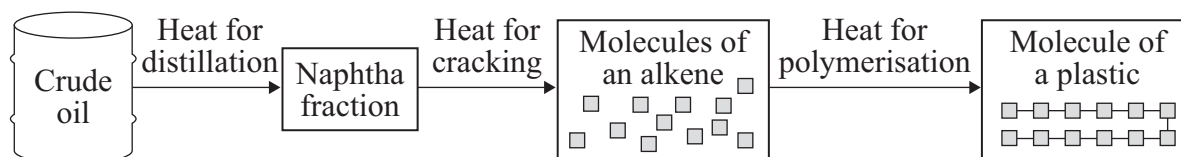
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(2 marks)



- 6 To make a plastic, such as poly(ethene), from crude oil involves many processes.



- 6 (a) Describe how crude oil is separated into fractions.

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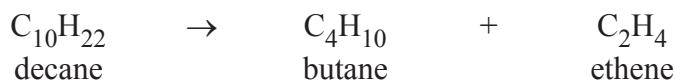
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(2 marks)

- 6 (b) Ethene is produced by cracking the hydrocarbons in the naphtha fraction.

- 6 (b) (i) Balance the symbol equation for this reaction.



(1 mark)

- 6 (b) (ii) Describe how cracking is carried out.

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(2 marks)



- 6 (c) Alkanes, such as butane (C_4H_{10}), do **not** form polymers.

Alkenes, such as ethene (C_2H_4), do form polymers.

Explain these statements.

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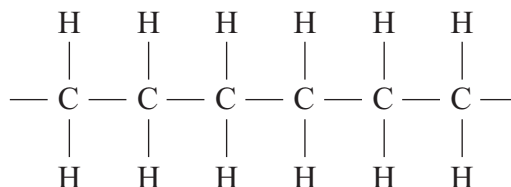
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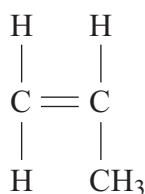
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(2 marks)

- 6 (d) Ethene molecules form the polymer poly(ethene). One molecule in poly(ethene) will contain thousands of carbon atoms. The diagram represents part of a poly(ethene) molecule.



Propene molecules form the polymer poly(propene).



Propene molecule

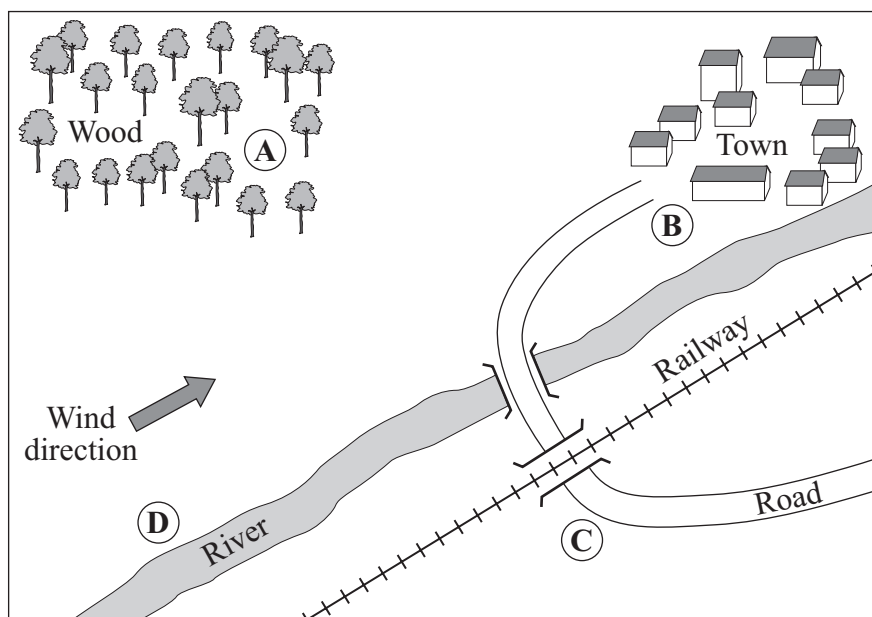
Draw a diagram to represent part of a poly(propene) molecule.

(2 marks)

Turn over ►



- 7 A company wants to extract limestone from an area of natural beauty. The Government has granted permission for the company to take and analyse samples of limestone. The company selects four sites, **A**, **B**, **C** and **D**, within the area and takes four samples from each site.



- 7 (a) The limestone is analysed by:
- heating 5 g of each sample for 30 minutes
 - allowing the sample to cool in a dry, argon atmosphere
 - weighing the solid remaining

The table shows the company's results.

Site	Mass of solid remaining in g			
	Sample 1	Sample 2	Sample 3	Sample 4
A	3.15	3.10	3.20	3.19
B	3.25	3.21	3.24	3.26
C	2.85	2.95	2.92	3.00
D	2.98	2.88	2.92	2.82

Limestone is a rock containing calcium carbonate, CaCO_3

If the limestone is pure calcium carbonate then the mass of solid remaining would be 2.80 g.

Why does the mass of limestone decrease when it is heated?

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(1 mark)



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7

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